MITSUBISHI ELECTRIC

700 series

INVERTER
FR-A700
INSTALLATION GUIDELINE
FR-A740-00023 to 12120-EC

Thank you for choosing this Mitsubishi Inverter.
Please read through this Installation Guideline and a CD-ROM enclosed to operate this inverter correctly.
Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
Please forward this Installation Guideline and the CD-ROM to the end user.

CONTENTS

【1】 INSTALLATION OF THE INVERTER AND INSTRUCTIONS..... 1
【2】 OUTLINE DIMENSION DRAWING 2
【3】 WIRING..... 3
【4】 PRECAUTIONS FOR USE OF THE INVERTER..... 8
【5】 PARAMETER LIST..... 10
【6】 TROUBLESHOOTING..... 18

A 700

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect the inverter until you have read through this Installation Guideline and appended documents carefully and can use the equipment correctly. Do not use the inverter until you have a full knowledge of the equipment, safety information and instructions. In this Installation Guideline, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠WARNING Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

⚠CAUTION Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that even the ⚠CAUTION level may lead to a serious consequence according to conditions. Please follow strictly the instructions of both levels because they are important to personnel safety.

1. Electric Shock Prevention

⚠WARNING

- While power is on or when the inverter is running, do not open the front cover. Otherwise you may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals or the charging part of the circuitry and get an electric shock.
- Even if power is off, do not remove the front cover except for wiring or periodic inspection.You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, check to make sure that the operation panel indicator is off, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.
- This inverter must be earthed (grounded). Earthing (Grounding) must conform to the requirements of national and local safety regulations and electrical codes. (NEC section 250, IEC 536 class 1 and other applicable standards)
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the inverter before wiring. Otherwise, you may get an electric shock or be injured.
- Perform setting dial and key operations with dry hands to prevent an electric shock. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.
- Do not replace the cooling fan while power is on. It is dangerous to replace the cooling fan while power is on.
- Do not touch the printed circuit board with wet hands. You may get an electric shock.
- When measuring the main circuit capacitor capacity, the DC voltage is applied to the motor for 1s at powering off. Never touch the motor terminal, etc. right after powering off to prevent an electric shock.

2. Fire Prevention

⚠CAUTION

- Install the inverter on an incombustible wall without holes, etc. Mounting it to or near combustible material can cause a fire.
- If the inverter has become faulty, switch off the inverter power. A continuous flow of large current could cause a fire.
- When using a brake resistor, make up a sequence that will turn off power when an alarm signal is output. Otherwise, the brake resistor may excessively overheat due to damage of the brake transistor and such, causing a fire.
- Do not connect a resistor directly to the DC terminals P/+, N/−. This could cause a fire.

3. Injury Prevention

⚠CAUTION

- Apply only the voltage specified in the instruction manual to each terminal. Otherwise, burst, damage, etc. may occur.
- Ensure that the cables are connected to the correct terminals. Otherwise, burst, damage, etc. may occur.
- Always make sure that polarity is correct to prevent damage, etc. Otherwise, burst, damage, etc. may occur.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.

4. Additional Instructions

Also note the following points to prevent an accidental failure, injury, electric shock, etc.

(1) Transportation and installation

⚠CAUTION

- When carrying products, use correct lifting gear to prevent injury.
- Do not stack the inverter boxes higher than the number recommended.
- Ensure that installation position and material can withstand the weight of the inverter. Install according to the information in the instruction manual.
- Do not install or operate the inverter if it is damaged or has parts missing. This can result in breakdowns.
- When carrying the inverter, do not hold it by the front cover or setting dial; it may fall off or fail.
- Do not stand or rest heavy objects on the product.
- Check the inverter mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.
- As the inverter is a precision instrument, do not drop or subject it to impact.
- Use the inverter under the following environmental conditions. Otherwise, the inverter may be damaged.

Environment	Ambient temperature	LD, ND (initial setting), HD	-10°C to +50°C (non-freezing)
		SLD	-10°C to +40°C (non-freezing)
	Ambient humidity		90% RH or less (non-condensing)
	Storage temperature		-20°C to +65°C *1
	Atmosphere		Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
	Altitude, vibration		Maximum 1000m above sea level for standard operation. After that derate by 3% for every extra 500m up to 2500m (92%) 5.9m/s^2 or less *2

*1 Temperature applicable for a short time, e.g. in transit.

*2 2.9m/s^2 or less for the 04320 or more.

(2) Wiring

⚠CAUTION

- Do not install a power factor correction capacitor or surge suppressor/radio noise filter (capacitor type filter) on the inverter output side.
- The connection orientation of the output cables U, V, W to the motor will affect the direction of rotation of the motor.

(3) Test operation and adjustment

⚠CAUTION

- Before starting operation, confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.

(4) Operation

⚠WARNING

- When you have chosen the retry function, stay away from the equipment as it will restart suddenly after an alarm stop.
- Since the STOP RESET key is valid only when functions are set (*refer to the Instruction Manual*), provide a circuit and switch separately to make an emergency stop (power off, mechanical brake operation for emergency stop, etc).
- Make sure that the start signal is off before resetting the inverter alarm. A failure to do so may restart the motor suddenly.
- The load used should be a three-phase induction motor only. Connection of any other electrical equipment to the inverter output may damage the inverter as well as equipment.
- Performing pre-excitation (LX signal and X13 signal) under torque control (real sensorless vector control) may start the motor running at a low speed even when the start command (STF or STR) is not input. The motor may run also at a low speed when the speed limit value = 0 with a start command input. Perform pre-excitation after making sure that there will be no problem in safety if the motor runs.
- Do not modify the equipment.
- Do not perform parts removal which is not instructed in manuals. Doing so may lead to fault or damage of the inverter.

⚠CAUTION

- The electronic thermal relay function does not guarantee protection of the motor from overheating.
- Do not use a magnetic contactor on the inverter input for frequent starting/ stopping of the inverter.
- Use a noise filter to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.
- Take measures to suppress harmonics. Otherwise power supply harmonics from the inverter may heat/damage the power factor correction capacitor and generator.
- When a 400V class motor is inverter-driven, please use an insulation-enhanced motor or measures taken to suppress surge voltages. Surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When a 600V class motor is inverter-driven, it should be insulation-enhanced or surge voltages suppressed. Surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
- When parameter clear or all clear is performed, reset the required parameters before starting operations. Each parameter returns to the initial value.
- The inverter can be easily set for high-speed operation. Before changing its setting, fully examine the performances of the motor and machine.
- In addition to the inverter's holding function, install a holding device to ensure safety.
- Before running an inverter which had been stored for a long period, always perform inspection and test operation.
- For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

(5) Emergency stop

⚠CAUTION

- Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.
- When the breaker on the inverter input side trips, check for the wiring fault (short circuit), damage to internal parts of the inverter, etc. Identify the cause of the trip, then remove the cause and power on the breaker.
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.

(6) Maintenance, inspection and parts replacement

⚠CAUTION

- Do not carry out a megger (insulation resistance) test on the control circuit of the inverter.

(7) Disposing of the inverter

⚠CAUTION

- Treat as industrial waste.

General instructions

Many of the diagrams and drawings in instruction manuals show the inverter without a cover, or partially open. Never run the inverter in this status. Always replace the cover and follow instruction manuals when operating the inverter.

1 INSTALLATION OF THE INVERTER AND INSTRUCTIONS

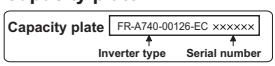
• Inverter Type

FR - A740 - 00126 - EC

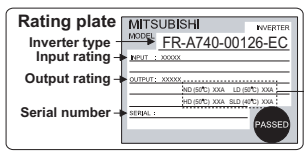
Symbol	Voltage Class
A740	Three-phase 400V class

Symbol	Type number
00023 to 12120	Displays the rated current

Capacity plate



Rating plate

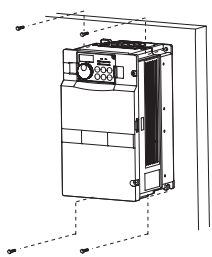


	Overload current rating	Ambient temperature
SLD	110% 60s, 120% 3s	40℃ (104°F)
LD	120% 60s, 150% 3s	50℃ (122°F)
ND	150% 60s, 200% 3s	50℃ (122°F)
HD	200% 60s, 250% 3s	50℃ (122°F)

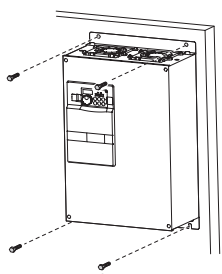
• Installation of the inverter

Installation on the enclosure

00620 or less



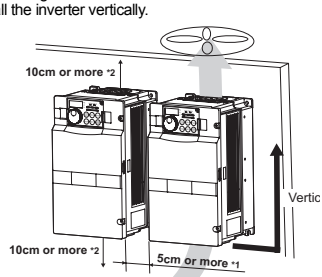
00770 or more



Fix six positions for the FR-A740-04320 to 08660 and fix eight positions for the FR-A740-09620 to 12120.

CAUTION

- When encasing multiple inverters, install them in parallel as a cooling measure.
- Install the inverter vertically.



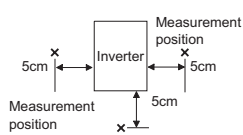
*1 1cm or more for 00126 or less
10cm or more for 02160 or more
*2 20cm or more for 02160 or more

• General Precaution

The bus capacitor discharge time is 10 minutes. Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for residual voltage between terminal P/+ and N/- with a meter etc., to avoid a hazard of electrical shock.

• Environment

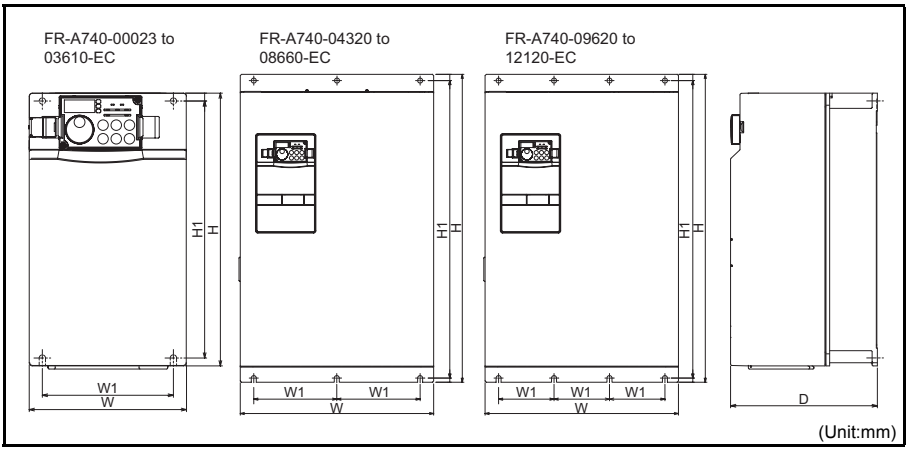
Before installation, check that the environment meets following specifications.

Ambient temperature	LD, ND (initial setting),HD: -10°C to + 50°C (non-freezing) SLD: -10°C to + 40°C (non-freezing) 
Ambient humidity	90%RH or less (non-condensing)
Storage temperature	-20°C to + 65°C
Ambience	Indoors (No corrosive and flammable gases, oil mist, dust and dirt.)
Altitude, vibration	Below 1000m, 5.9m/s^2 or less (2.9m/s^2 or less for the 04320 or more)

CAUTION

- Install the inverter on a strong surface securely and vertically with bolts.
- Leave enough clearances and take cooling measures.
- Avoid places where the inverter is subjected to direct sunlight, high temperature and high humidity.
- Install the inverter on a non-combustible wall surface.

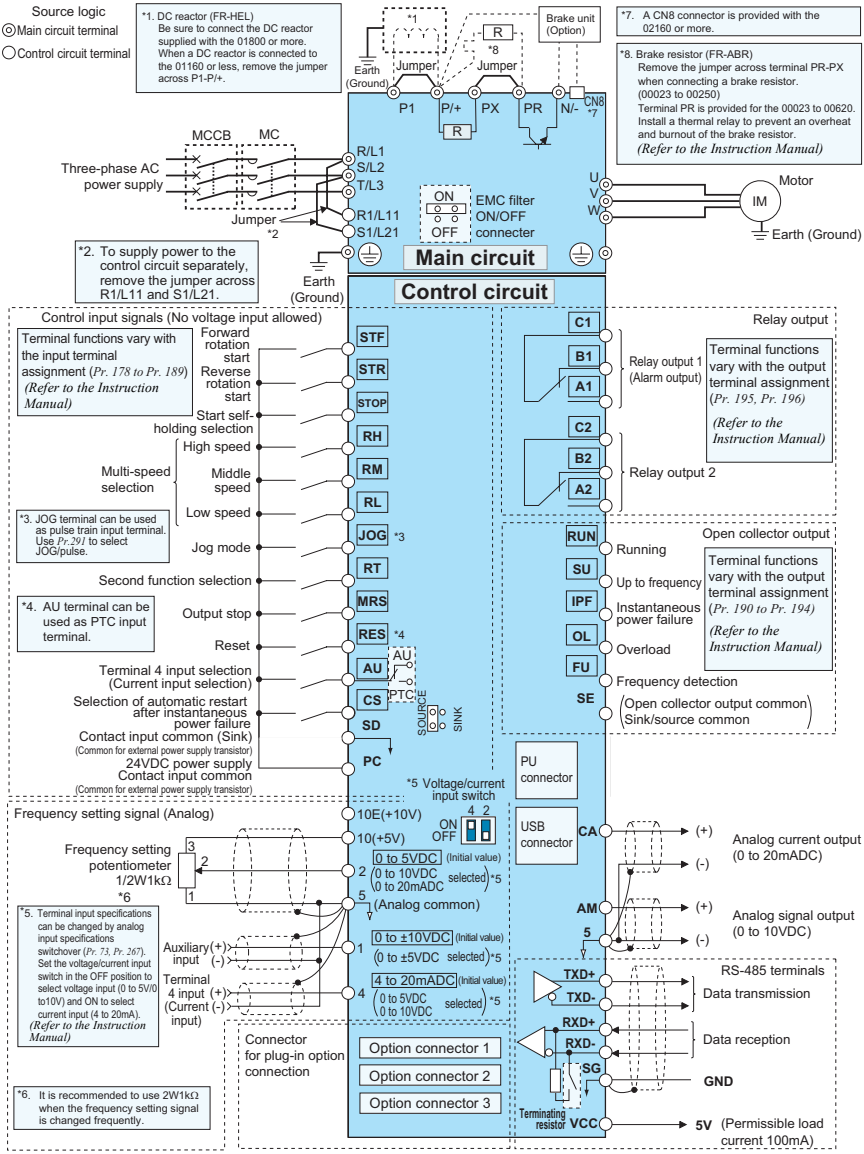
2 OUTLINE DIMENSION DRAWING



Inverter Type	W	W1	H	H1	D
FR-A740-00023-EC	150	125	260	245	140
FR-A740-00038-EC					
FR-A740-00052-EC					
FR-A740-00083-EC					
FR-A740-00126-EC					
FR-A740-00170-EC	220	195			170
FR-A740-00250-EC					
FR-A740-00310-EC			300	285	190
FR-A740-00380-EC					
FR-A740-00470-EC	250	230	400	380	190
FR-A740-00620-EC					
FR-A740-00770-EC	325	270	550	530	195
FR-A740-00930-EC	435	380	550	525	250
FR-A740-01160-EC					
FR-A740-01800-EC					
FR-A740-02160-EC	465	400	620	595	300
FR-A740-02600-EC					
FR-A740-03250-EC			740	715	360
FR-A740-03610-EC					
FR-A740-04320-EC	498	200	1010	985	380
FR-A740-04810-EC					
FR-A740-05470-EC	680	300			
FR-A740-06100-EC					
FR-A740-06830-EC					
FR-A740-07700-EC	790	315	1330	1300	440
FR-A740-08660-EC					
FR-A740-09620-EC	995	300	1580	1550	
FR-A740-10940-EC					
FR-A740-12120-EC					

3 WIRING

3.1 Terminal connection diagram



CAUTION

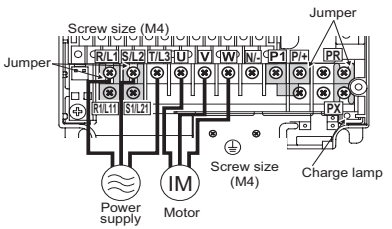
- To prevent a malfunction due to noise, keep the signal cables more than 10cm away from the power cables.
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean.
  When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.
- Set the voltage/current input switch correctly. Different setting may cause a fault, failure or malfunction.

3.2 Main circuit terminal

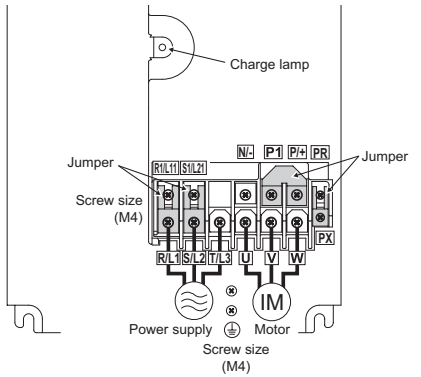
(1) Terminal layout and wiring

400V class

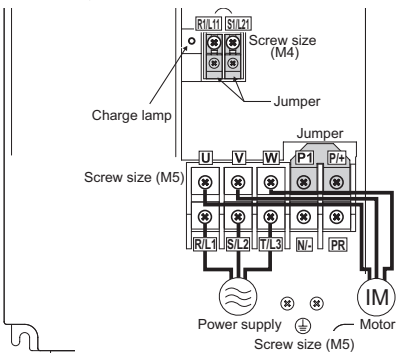
FR-A740-00023 to 00126-EC



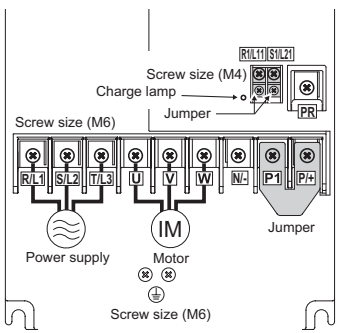
FR-A740-00170, 00250-EC



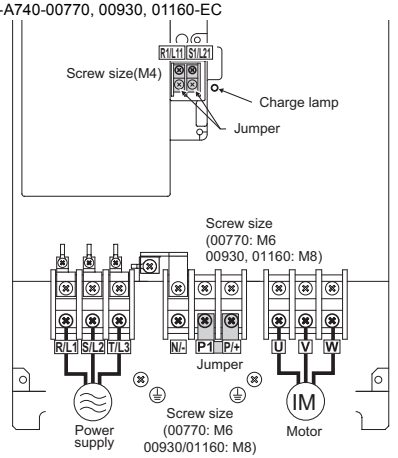
FR-A740-00310, 00380-EC



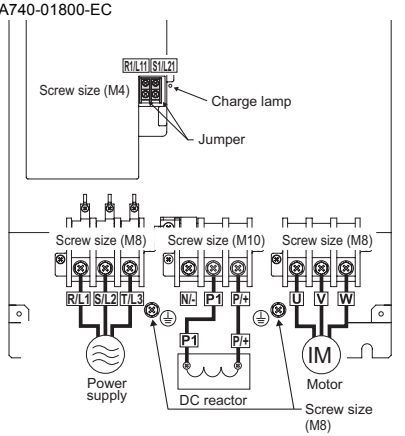
FR-A740-00470, 00620-EC



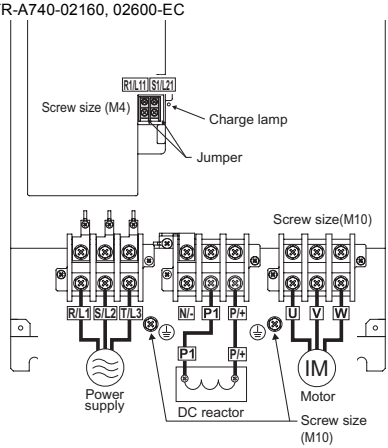
FR-A740-00770, 00930, 01160-EC



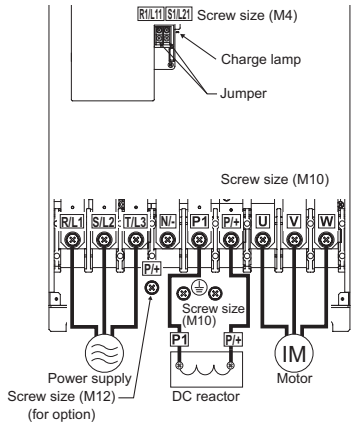
FR-A740-01800-EC



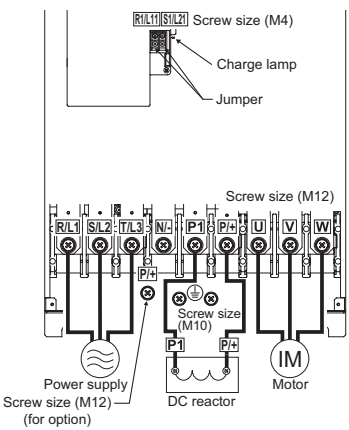
FR-A740-02160, 02600-EC



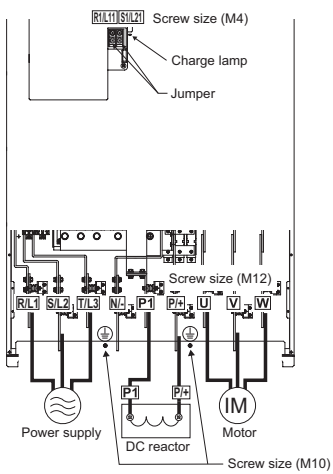
FR-A740-03250, 03610-EC



FR-A740-04320, 04810-EC

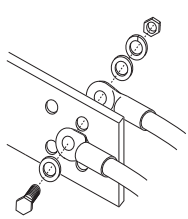


FR-A740-05470 to 12120-EC



CAUTION

- The power supply cables must be connected to R/L1, S/L2, T/L3. Never connect the power cable to the U, V, W of the inverter. Doing so will damage the inverter. (Phase sequence needs not to be matched.)
- Connect the motor to U, V, W. At this time, turning on the forward rotation switch (signal) rotates the motor in the counterclockwise direction when viewed from the motor shaft.
- When wiring the inverter main circuit conductor of the 05470 or more, tighten a nut from the right side of the conductor. When wiring two wires, place wires on both sides of the conductor. (Refer to the drawing below.) For wiring, use bolts (nuts) provided with the inverter.



(2) Applied cable size

Select the recommended cable size to ensure that a voltage drop will be 2% max.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.
The following table indicates a selection example for the wiring length of 20m.

400V class (when input power supply is 440V)

Applicable Inverter Type	Terminal Screw Size *4	Tightening Torque N·m	Crimping Terminal		Cable Sizes								
					HIV, etc. (mm²) *1				AWG/MCM *2		PVC, etc. (mm²) *3		
			R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	P/+, P1	Earth (Ground) Cable	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	Earth (Ground) Cable
FR-A740-00023 to 00126-EC	M4	1.5	2-4	2-4	2	2	2	2	14	14	2.5	2.5	2.5
FR-A740-00170-EC	M4	1.5	2-4	2-4	2	2	3.5	3.5	12	14	2.5	2.5	4
FR-A740-00250-EC	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	3.5	12	12	4	4	4
FR-A740-00310-EC	M5	2.5	5.5-5	5.5-5	5.5	5.5	5.5	8	10	10	6	6	10
FR-A740-00380-EC	M5	2.5	8-5	8-5	8	8	8	8	8	8	10	10	10
FR-A740-00470-EC	M6	4.4	14-6	8-6	14	8	14	14	6	8	16	10	16
FR-A740-00620-EC	M6	4.4	14-6	14-6	14	14	22	14	6	6	16	16	16
FR-A740-00770-EC	M6	4.4	22-6	22-6	22	22	22	14	4	4	25	25	16
FR-A740-00930-EC	M8	7.8	22-8	22-8	22	22	22	14	4	4	25	25	16
FR-A740-01160-EC	M8	7.8	38-8	38-8	38	38	38	22	1	2	50	50	25
FR-A740-01800-EC	M8	7.8	60-8	60-8	60	60	60	22	1/0	1/0	50	50	25
FR-A740-02160-EC	M10	14.7	60-10	60-10	60	60	60	38	1/0	1/0	50	50	25
FR-A740-02600-EC	M10	14.7	60-10	60-10	60	60	80	38	3/0	3/0	50	50	25
FR-A740-03250-EC	M10-M12	14.7	80-10	80-10	80	80	80	38	3/0	3/0	70	70	35
FR-A740-03610-EC	M10-M12	14.7	100-10	100-10	100	100	100	38	4/0	4/0	95	95	50
FR-A740-04320-EC	M12-M10	24.5	150-12	150-12	125	150	150	38	250	250	120	120	70
FR-A740-04810-EC	M12-M10	24.5	150-12	150-12	150	150	150	38	300	300	150	150	95
FR-A740-05470-EC	M12-M10	24.5	100-12	100-12	2×100	2×100	2×100	60	2×4/0	2×4/0	2×95	2×95	95
FR-A740-06100-EC	M12-M10	24.5	100-12	100-12	2×100	2×100	2×125	60	2×4/0	2×4/0	2×95	2×95	95
FR-A740-06830-EC	M12-M10	24.5	150-12	150-12	2×125	2×125	2×125	60	2×250	2×250	2×120	2×120	120
FR-A740-07700-EC	M12-M10	24.5	150-12	150-12	2×150	2×150	2×150	100	2×300	2×300	2×150	2×150	150
FR-A740-08660-EC	M12-M10	24.5	C2-200	C2-200	2×200	2×200	2×200	100	2×350	2×350	2×185	2×185	2×95
FR-A740-09620-EC	M12-M10	24.5	C2-200	C2-200	2×200	2×200	2×200	100	2×400	2×400	2×185	2×185	2×95
FR-A740-10940-EC	M12-M10	24.5	C2-250	C2-250	2×250	2×250	2×250	100	2×500	2×500	2×240	2×240	2×120
FR-A740-12120-EC	M12-M10	24.5	C2-200	C2-250	3×200	2×250	3×200	2×100	2×500	2×500	2×240	2×240	2×120

*1 For the 01800 or less, the cable size is that of the cable (HIV cable (600V class 2 vinyl-insulated cable) etc.) with continuous maximum permissible temperature of 75°C. Assumes that the ambient temperature is 50°C or less and the wiring distance is 20m or less.
For the 02160 or more, the recommended cable size is that of the cable (LMFC (heat resistant flexible cross-linked polyethylene insulated cable) etc.) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 50°C or less and wiring is performed in an enclosure.

*2 For the 01160 or less, the recommended cable size is that of the cable (THHW cable) with continuous maximum permissible temperature of 75°C. Assumes that the ambient temperature is 40°C or less and the wiring distance is 20m or less.
For the 01800 or more, the recommended cable size is that of the cable (THHN cable) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 40°C or less and wiring is performed in an enclosure.
(Selection example for use mainly in the United States.)

*3 For the 01160 or less, the recommended cable size is that of the cable (PVC cable) with continuous maximum permissible temperature of 70°C. Assumes that the ambient temperature is 40°C or less and the wiring distance is 20m or less.
For the 01800 or more, the recommended cable size is that of the cable (XLPE cable) with continuous maximum permissible temperature of 90°C. Assumes that the ambient temperature is 40°C or less and wiring is performed in an enclosure.
(Selection example for use mainly in Europe.)

*4 The terminal screw size indicates the terminal size for R/L1, S/L2, T/L3, U, V, W, and a screw for earthing (grounding).
For the 03250 and 03610, screw sizes are different (<R/L1, S/L2, T/L3, U, V, W, a screw for earthing (grounding)> - <P/+ for option connection>)
For the 04320 or more, screw sizes are different. (<R/L1, S/L2, T/L3, U, V, W> - <a screw for earthing (grounding)>)

The line voltage drop can be calculated by the following formula:

$$\text{line voltage drop [V]} = \frac{\sqrt{3} \times \text{wire resistance[m}\Omega\text{/m]} \times \text{wiring distance[m]} \times \text{current[A]}}{1000}$$

Use a larger diameter cable when the wiring distance is long or when it is desired to decrease the voltage drop (torque reduction) in the low speed range.

CAUTION

- Tighten the terminal screw to the specified torque.
  A screw that has been tighten too loosely can cause a short circuit or malfunction.
  A screw that has been tighten too tightly can cause a short circuit or malfunction due to the unit breakage.
- Use crimping terminals with insulation sleeve to wire the power supply and motor.

(3) Total wiring length (FR-A720/A740)

The overall wiring length for connection of a single motor or multiple motors should be within the value in the table below. (The wiring length should be 100m maximum for vector control.)

Pr. 72 PWM frequency selection setting (carrier frequency) *	00023	00038	00052 or more
2 (2kH) or less	300m	500m	500m
3 (3kHz), 4 (4kHz)	200m	300m	500m
5 (5kHz) to 9 (9kHz)	100m		
10 (10kHz) or more	50m		

When driving a 400V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor.
Take the following measures 1) or 2) in this case.

1) Use a "400V class inverter-driven insulation-enhanced motor".
2) Connect the surge voltage suppression filter (FR-ASF-H) to the 01800 or less and the sine wave filter (MT-BSL/BSC) to the 02160 or more on the inverter output side.

CAUTION

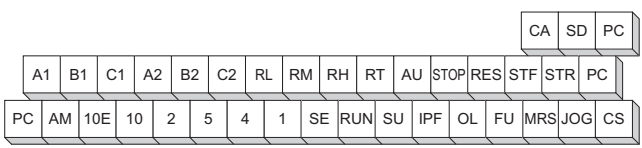
- Especially for long-distance wiring, the inverter may be affected by a charging current caused by the stray capacitances of the wiring, leading to a malfunction of the overcurrent protective function or fast response current limit function or a malfunction or fault of the equipment connected on the inverter output side. If fast response current limit function malfunctions, disable this function. (For *Pr. 156 Stall prevention operation selection, refer to* 📖 *Instruction Manual.*)
- For details of *Pr. 72 PWM frequency selection , refer to* 📖 *Instruction Manual*. (When using an option sine wave filter (MT-BSL/BSC) for the 02160 or more, set "25" (2.5kHz) in *Pr. 72*.)
  For explanation of surge voltage suppression filter (FR-ASF-H) and sine wave filter (MT-BSL/BSC), refer to the manual of each option.
- Do not perform vector control with a surge voltage suppression filter (FR-ASF-H) or sine wave filer (MT-BSL/BSC) connected.

(4) Cable size of the control circuit power supply (terminal R1/L11, S1/L21)

- Terminal screw size: M4
- Cable size: 0.75mm^2 to 2mm^2
- Tightening torque: 1.5N·m

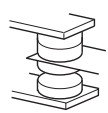
3.3 Control circuit terminals

(1) Terminal layout

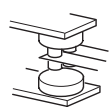


(2) Instructions for wiring of the control circuit terminal

1) Terminals 5, PC and SE are common to the I/O signals and isolated from each other. Do not earth (ground). Avoid connecting the terminal PC and 5 and the terminal SE and 5.
2) Use shielded or twisted cables for connection to the control circuit terminals and run them away from the main and power circuits (including the 200V relay sequence circuit).
3) Use two or more parallel micro-signal contacts or twin contacts to prevent a contact faults when using contact inputs since the control circuit input signals are micro-currents.



Micro signal contacts



Twin contacts

4) Do not apply a voltage to the contact input terminals (e.g. STF) of the control circuit.
5) Always apply a voltage to the alarm output terminals (A, B, C) via a relay coil, lamp, etc.
6) It is recommended to use the cables of 0.75mm^2 gauge for connection to the control circuit terminals.
   If the cable gauge used is 1.25mm^2 or more, the front cover may be lifted when there are many cables running or the cables are run improperly, resulting in an operation panel contact fault.
7) The wiring length should be 30m maximum.

4 PRECAUTIONS FOR USE OF THE INVERTER

The FR-A700 series is a highly reliable product, but incorrect peripheral circuit making or operation/handling method may shorten the product life or damage the product.
Before starting operation, always recheck the following items.

(1) Use crimping terminals with insulation sleeve to wire the power supply and motor.

(2) Application of power to the output terminals (U, V, W) of the inverter will damage the inverter. Never perform such wiring.

(3) After wiring, wire offcuts must not be left in the inverter.
Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., take care not to allow chips and other foreign matter to enter the inverter.

(4) Use cables of the size to make a voltage drop 2% maximum.
If the wiring distance is long between the inverter and motor, a main circuit cable voltage drop will cause the motor torque to decrease especially at the output of a low frequency.
Refer to *page 6* for the recommended cable sizes.

(5) The overall wiring length should be 500m maximum.
(The wiring length should be 100m maximum for vector control.)
Especially for long distance wiring, the fast response current limit function may decrease or the equipment connected to the secondary side may malfunction or become faulty under the influence of a charging current due to the stray capacity of the wiring. Therefore, note the overall wiring length. *(Refer to page 7.)*

(6) Electromagnetic wave interference
The input/output (main circuit) of the inverter includes high frequency components, which may interfere with the communication devices (such as AM radios) used near the inverter. An EMC filter can minimize noise interference.

(7) Do not install a power factor correction capacitor, surge suppressor or radio noise filter on the inverter output side.
This will cause the inverter to trip or the capacitor, and surge suppressor to be damaged. If any of the above devices is installed, immediately remove it.

(8) Before starting wiring or other work after the inverter is operated, wait for at least 10 minutes after the power supply has been switched off, and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power off and it is dangerous.

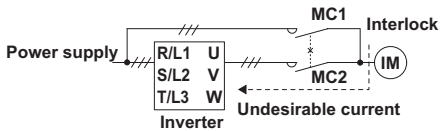
(9) A short circuit or earth (ground) fault on the inverter output side may damage the inverter modules.
- Fully check the insulation resistance of the circuit prior to inverter operation since repeated short circuits caused by peripheral circuit inadequacy or an earth (ground) fault caused by wiring inadequacy or reduced motor insulation resistance may damage the inverter modules.
- Fully check the to-earth (ground) insulation and inter-phase insulation of the inverter output side before power-on. Especially for an old motor or use in hostile atmosphere, securely check the motor insulation resistance etc.

(10) Do not use the inverter input side magnetic contactor to start/stop the inverter.
Always use the start signal (ON/OFF of STF and STR signals) to start/stop the inverter.

(11) Across P/+ and PR terminals, connect only an external regenerative brake discharge resistor.
Do not connect a mechanical brake.

(12) Do not apply a voltage higher than the permissible voltage to the inverter I/O signal circuits.
Application of permissible voltage to the inverter I/O signal circuit and incorrect polarity may damage the I/O terminal. Especially check the wiring to prevent the speed setting potentiometer from being connected incorrectly to short terminals 10E-5.

(13) Provide electrical and mechanical interlocks for MC1 and MC2 which are used for bypass operation.
When the wiring is incorrect or if there is an electronic bypass circuit as shown on the right, the inverter will be damaged by leakage current from the power supply due to arcs generated at the time of switch-over or chattering caused by a sequence error.
(Commercial operation can not be performed with the vector dedicated motor (SF-V5RU, SF-THY).)



(14) If the machine must not be restarted when power is restored after a power failure, provide a magnetic contactor in the inverter's input side and also make up a sequence which will not switch on the start signal.
If the start signal (start switch) remains on after a power failure, the inverter will automatically restart as soon as the power is restored.

(15) Instructions for overload operation
When performing an operation of frequent start/stop with the inverter, rise/fall in the temperature of the transistor element of the inverter will repeat due to a continuous flow of large current, shortening the life from thermal fatigue. Since thermal fatigue is related to the amount of current, the life can be increased by reducing current at locked condition, starting current, etc. Decreasing current may increase the life. However, decreasing current will result in insufficient torque and the inverter may not start. Therefore, choose the inverter which has enough allowance for current (up to 2 rank larger in capacity).

(16) Make sure that the specifications and rating match the system requirements.

(17) A motor with encoder is necessary for vector control. In addition, connect the encoder directly to the backlash-free motor shaft. An encoder is not necessary for real sensorless vector control.

5 PARAMETER LIST

5.1 Parameter list

For simple variable-speed operation of the inverter, the initial setting of the parameters may be used as they are. Set the necessary parameters to meet the load and operational specifications. Parameter setting, change and check can be made from the operation panel (FR-DU07).

REMARKS

- ◎ indicates simple mode parameters. (initially set to extended mode)
- The shaded parameters in the table allow its setting to be changed during operation even if "0" (initial value) is set in *Pr.77 Parameter write selection*.

Parameter	Name	Setting Range	Initial Value
◎ 0	Torque boost	0 to 30%	6/4/3/2/ 1% *1
◎ 1	Maximum frequency	0 to 120Hz	120/ 60Hz *2
◎ 2	Minimum frequency	0 to 120Hz	0Hz
◎ 3	Base frequency	0 to 400Hz	50Hz
◎ 4	Multi-speed setting (high speed)	0 to 400Hz	50Hz
◎ 5	Multi-speed setting (middle speed)	0 to 400Hz	30Hz
◎ 6	Multi-speed setting (low speed)	0 to 400Hz	10Hz
◎ 7	Acceleration time	0 to 3600/360s	5/15s *3
◎ 8	Deceleration time	0 to 3600/360s	5/15s *3
◎ 9	Electronic thermal O/L relay	0 to 500/ 0 to 3600A *2	Rated inverter current
10	DC injection brake operation frequency	0 to 120Hz, 9999	3Hz
11	DC injection brake operation time	0 to 10s, 8888	0.5s
12	DC injection brake operation voltage	0 to 30%	4/2/ 1%*4
13	Starting frequency	0 to 60Hz	0.5Hz
14	Load pattern selection	0 to 5	0
15	Jog frequency	0 to 400Hz	5Hz
16	Jog acceleration/ deceleration time	0 to 3600/360s	0.5s
17	MRS input selection	0, 2, 4	0
18	High speed maximum frequency	120 to 400Hz	120/ 60Hz *2
19	Base frequency voltage	0 to 1000V, 8888, 9999	8888
20	Acceleration/deceleration reference frequency	1 to 400Hz	50Hz
21	Acceleration/deceleration time increments	0, 1	0
22	Stall prevention operation level (torque limit level)	0 to 400%	150%
23	Stall prevention operation level compensation factor at double speed	0 to 200%, 9999	9999
24 to 27	Multi-speed setting (4 speed to 7 speed)	0 to 400Hz, 9999	9999
28	Multi-speed input compensation selection	0, 1	0
29	Acceleration/deceleration pattern selection	0 to 5	0
30	Regenerative function selection	0, 1, 2, 10, 11, 20, 21	0

Parameter	Name	Setting Range	Initial Value
31	Frequency jump 1A	0 to 400Hz, 9999	9999
32	Frequency jump 1B	0 to 400Hz, 9999	9999
33	Frequency jump 2A	0 to 400Hz, 9999	9999
34	Frequency jump 2B	0 to 400Hz, 9999	9999
35	Frequency jump 3A	0 to 400Hz, 9999	9999
36	Frequency jump 3B	0 to 400Hz, 9999	9999
37	Speed display	0, 1 to 9998	0
41	Up-to-frequency sensitivity	0 to 100%	10%
42	Output frequency detection	0 to 400Hz	6Hz
43	Output frequency detection for reverse rotation	0 to 400Hz, 9999	9999
44	Second acceleration/ deceleration time	0 to 3600/360s	5s
45	Second deceleration time	0 to 3600/ 360s, 9999	9999
46	Second torque boost	0 to 30%, 9999	9999
47	Second V/F (base frequency)	0 to 400Hz, 9999	9999
48	Second stall prevention operation current	0 to 220%	150%
49	Second stall prevention operation frequency	0 to 400Hz, 9999	0Hz
50	Second output frequency detection	0 to 400Hz	30Hz
51	Second electronic thermal O/L relay	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
52	DU/PU main display data selection	0, 5 to 14, 17 to 20, 22 to 25, 32 to 35, 50 to 57, 100	0
54	CA terminal function selection	1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53, 70	1
55	Frequency monitoring reference	0 to 400Hz	50Hz
56	Current monitoring reference	0 to 500/0 to 3600A *2	Rated inverter current
57	Restart coasting time	0, 0.1 to 5s, 9999/ 0, 0.1 to 30s, 9999 *2	9999
58	Restart cushion time	0 to 60s	1s
59	Remote function selection	0, 1, 2, 3	0

Parameter	Name	Setting Range	Initial Value
60	Energy saving control selection	0, 4	0
61	Reference current	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
62	Reference value at acceleration	0 to 220%, 9999	9999
63	Reference value at deceleration	0 to 220%, 9999	9999
64	Starting frequency for elevator mode	0 to 10Hz, 9999	9999
65	Retry selection	0 to 5	0
66	Stall prevention operation reduction starting frequency	0 to 400Hz	50Hz
67	Number of retries at alarm occurrence	0 to 10, 101 to 110	0
68	Retry waiting time	0 to 10s	1s
69	Retry count display erase	0	0
70	Special regenerative brake duty	0 to 30%/ 0 to 10% *2	0%
71	Applied motor	0 to 8, 13 to 18, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54	0
72	PWM frequency selection	0 to 15/ 0 to 6, 25 *2	2
73	Analog input selection	0 to 7, 10 to 17	1
74	Input filter time constant	0 to 8	1
75	Reset selection/ disconnected PU detection/ PU stop selection	0 to 3, 14 to 17, 100 to 103, 114 to 117	14
76	Alarm code output selection	0, 1, 2	0
77	Parameter write selection	0, 1, 2	0
78	Reverse rotation prevention selection	0, 1, 2	0
◎ 79	Operation mode selection	0, 1, 2, 3, 4, 6, 7	0
80	Motor capacity	0.4 to 55kW, 9999/ 0 to 3600kW, 9999 *2	9999
81	Number of motor poles	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 9999	9999
82	Motor excitation current	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
83	Motor rated voltage	0 to 1000V	400V
84	Rated motor frequency	10 to 120Hz	50Hz
89	Speed control gain (magnetic flux vector)	0 to 200%, 9999	9999
90	Motor constant (R1)	0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2	9999
91	Motor constant (R2)	0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2	9999

Parameter	Name	Setting Range	Initial Value
92	Motor constant (L1)	0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2	9999
93	Motor constant (L2)	0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2	9999
94	Motor constant (X)	0 to 500Ω (0 to 100%), 9999/ 0 to 100Ω (0 to 100%), 9999 *2	9999
95	Online auto tuning selection	0 to 2	0
96	Auto tuning setting/status	0, 1, 101	0
100	V/F1(first frequency)	0 to 400Hz, 9999	9999
101	V/F1(first frequency voltage)	0 to 1,000V	0V
102	V/F2(second frequency)	0 to 400Hz, 9999	9999
103	V/F2(second frequency voltage)	0 to 1,000V	0V
104	V/F3(third frequency)	0 to 400Hz, 9999	9999
105	V/F3(third frequency voltage)	0 to 1,000V	0V
106	V/F4(fourth frequency)	0 to 400Hz, 9999	9999
107	V/F4(fourth frequency voltage)	0 to 1,000V	0V
108	V/F5(fifth frequency)	0 to 400Hz, 9999	9999
109	V/F5(fifth frequency voltage)	0 to 1,000V	0V
110	Third acceleration/ deceleration time	0 to 3600/ 360s, 9999	9999
111	Third deceleration time	0 to 3600/ 360s, 9999	9999
112	Third torque boost	0 to 30%, 9999	9999
113	Third V/F (base frequency)	0 to 400Hz, 9999	9999
114	Third stall prevention operation current	0 to 220%	150%
115	Thrid stall prevention operation frequency	0 to 400Hz	0
116	Third output frequency detection	0 to 400Hz	50Hz
117	PU communication station number	0 to 31	0
118	PU communication speed	48, 96, 192, 384	192
119	PU communication stop bit length	0, 1, 10, 11	1
120	PU communication parity check	0, 1, 2	2
121	Number of PU communication retries	0 to10, 9999	1
122	PU communication check time interval	0, 0.1 to 999.8s, 9999	9999
123	PU communication waiting time setting	0 to 150ms, 9999	9999
124	PU communication CR/LF selection	0, 1, 2	1
◎ 125	Terminal 2 frequency setting gain frequency	0 to 400Hz	50Hz
◎ 126	Terminal 4 frequency setting gain frequency	0 to 400Hz	50Hz

Parameter	Name	Setting Range	Initial Value
127	PID control automatic switchover frequency	0 to 400Hz, 9999	9999
128	PID action selection	10, 11, 20, 21, 50, 51, 60, 61, 70, 71, 80, 81, 90, 91, 100, 101	10
129	PID proportional band	0.1 to 1000%, 9999	100%
130	PID integral time	0.1 to 3600s, 9999	1s
131	PID upper limit	0 to 100%, 9999	9999
132	PID lower limit	0 to 100%, 9999	9999
133	PID action set point	0 to 100%, 9999	9999
134	PID differential time	0.01 to 10.00s, 9999	9999
135	Electronic bypass sequence selection	0, 1	0
136	MC switchover interlock time	0 to 100s	1s
137	Start waiting time	0 to 100s	0.5s
138	Bypass selection at an alarm	0, 1	0
139	Automatic switchover frequency from inverter to bypass operation	0 to 60Hz, 9999	9999
140	Backlash acceleration stopping frequency	0 to 400Hz	1Hz
141	Backlash acceleration stopping time	0 to 360s	0.5s
142	Backlash deceleration stopping frequency	0 to 400Hz	1Hz
143	Backlash deceleration stopping time	0 to 360s	0.5s
144	Speed setting switchover	0, 2, 4, 6, 8, 10, 102, 104, 106, 108, 110	4
145	PU display language selection	0 to 7	1
148	Stall prevention level at 0V input	0 to 220%	150%
149	Stall prevention level at 10V input	0 to 220%	200%
150	Output current detection level	0 to 220%	150%
151	Output current detection signal delay time	0 to 10s	0s
152	Zero current detection level	0 to 220%	5%
153	Zero current detection time	0 to 1s	0.5s
154	Voltage reduction selection during stall prevention operation	0, 1	1
155	RT signal function validity condition selection	0, 10	0
156	Stall prevention operation selection	0 to 31, 100, 101	0
157	OL signal output timer	0 to 25s, 9999	0s
158	AM terminal function selection	1 to 3, 5 to 14, 17, 18, 21, 24, 32 to 34, 50, 52, 53, 70	1
159	Automatic switchover frequency range from bypass to inverter operation	0 to 10Hz, 9999	9999
◎ 160	User group read selection	0, 1, 9999	0
161	Frequency setting/key lock operation selection	0, 1, 10, 11	0

Parameter	Name	Setting Range	Initial Value
162	Automatic restart after instantaneous power failure selection	0, 1, 2, 10, 11, 12	0
163	First cushion time for restart	0 to 20s	0s
164	First cushion voltage for restart	0 to 100%	0%
165	Stall prevention operation level for restart	0 to 220%	150%
166	Output current detection signal retention time	0 to 10s, 9999	0.1s
167	Output current detection operation selection	0, 1	0
168	Parameter for manufacturer setting. Do not set.		
169			
170	Watt-hour meter clear	0, 10, 9999	9999
171	Operation hour meter clear	0, 9999	9999
172	User group registered display/batch clear	9999, (0 to 16)	0
173	User group registration	0 to 999, 9999	9999
174	User group clear	0 to 999, 9999	9999
178	STF terminal function selection	0 to 20, 22 to 28, 37, 42 to 44, 50, 60, 62, 64 to 71, 74, 9999	60
179	STR terminal function selection	0 to 20, 22 to 28, 37, 42 to 44, 50, 61, 62, 64 to 71, 74, 9999	61
180	RL terminal function selection	0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 74, 9999	0
181	RM terminal function selection		1
182	RH terminal function selection		2
183	RT terminal function selection		3
184	AU terminal function selection	0 to 20, 22 to 28, 37, 42 to 44, 50, 62 to 71, 74, 9999	4
185	JOG terminal function selection	0 to 20, 22 to 28, 37, 42 to 44, 50, 62, 64 to 71, 74, 9999	5
186	CS terminal function selection		6
187	MRS terminal function selection		24
188	STOP terminal function selection		25
189	RES terminal function selection		62

Parameter	Name	Setting Range	Initial Value
190	RUN terminal function selection	0 to 8, 10 to 20, 25 to 28, 30 to 36, 39, 41 to 47, 64, 70, 84, 85, 90 to 99, 100 to 108, 110 to 116, 120, 125 to 128, 130 to 136, 139, 141 to 147, 164, 170, 184, 185, 190 to 199, 9999	0
191	SU terminal function selection		1
192	IPF terminal function selection		2
193	OL terminal function selection		3
194	FU terminal function selection		4
195	ABC1 terminal function selection	0 to 8, 10 to 20, 25 to 28, 30 to 36, 39, 41 to 47, 64, 70, 84, 85, 90, 91, 94 to 99, 100 to 108, 110 to 116, 120, 125 to 128, 130 to 136, 139, 141 to 147, 164, 170, 184, 185, 190, 191, 194 to 199, 9999	99
196	ABC2 terminal function selection		9999
232 to 239	Multi-speed setting (8 speed to 15 speed)	0 to 400Hz, 9999	9999
240	Soft-PWM operation selection	0, 1	1
241	Analog input display unit switchover	0, 1	0
242	Terminal 1 added compensation amount (terminal 2)	0 to 100%	100%
243	Terminal 1 added compensation amount (terminal 4)	0 to 100%	75%
244	Cooling fan operation selection	0, 1	1
245	Rated slip	0 to 50%, 9999	9999
246	Slip compensation time constant	0.01 to 10s	0.5s
247	Constant-power range slip compensation selection	0, 9999	9999
250	Stop selection	0 to 100s,1000 to 1100s 8888, 9999	9999
251	Output phase failure protection selection	0, 1	1
252	Override bias	0 to 200%	50%
253	Override gain	0 to 200%	150%
255	Life alarm status display	(0 to 15)	0
256	Inrush current limit circuit life display	(0 to 100%)	100%
257	Control circuit capacitor life display	(0 to 100%)	100%
258	Main circuit capacitor life display	(0 to 100%)	100%
259	Main circuit capacitor life measuring	0, 1	0
260	PWM frequency automatic switchover	0, 1	1

Parameter	Name	Setting Range	Initial Value
261	Power failure stop selection	0, 1, 2, 11, 12	0
262	Subtracted frequency at deceleration start	0 to 20Hz	3Hz
263	Subtraction starting frequency	0 to 120Hz, 9999	50Hz
264	Power-failure deceleration time 1	0 to 3600/360s	5s
265	Power-failure deceleration time 2	0 to 3600s/ 360s, 9999	9999
266	Power failure deceleration time switchover frequency	0 to 400Hz	50Hz
267	Terminal 4 input selection	0, 1, 2	0
268	Monitor decimal digits selection	0,1, 9999	9999
269	Parameter for manufacturer setting. Do not set.		
270	Stop-on contact/load torque high-speed frequency control selection	0, 1, 2, 3	0
271	High-speed setting maximum current	0 to 220%	50%
272	Middle-speed setting minimum current	0 to 220%	100%
273	Current averaging range	0 to 400Hz, 9999	9999
274	Current averaging filter time constant	1 to 4000	16
275	Stop-on contact excitation current low-speed multiplying factor	0 to 1000%, 9999	9999
276	PWM carrier frequency at stop-on contact	0 to 9, 9999/ 0 to 4, 9999 *2	9999
278	Brake opening frequency	0 to 30Hz	3Hz
279	Brake opening current	0 to 220%	130%
280	Brake opening current detection time	0 to 2s	0.3s
281	Brake operation time at start	0 to 5s	0.3s
282	Brake operation frequency	0 to 30Hz	6Hz
283	Brake operation time at stop	0 to 5s	0.3s
284	Deceleration detection function selection	0, 1	0
285	Overspeed detection frequency (Excessive speed deviation detection frequency)	0 to 30Hz, 9999	9999
286	Droop gain	0 to 100%	0%
287	Droop filter time constant	0 to 1s	0.3s
288	Droop function activation selection	0, 1, 2, 10, 11	0
291	Pulse train I/O selection	0, 1, 10, 11, 20, 21, 100	0
292	Automatic acceleration/ deceleration	0, 1, 3, 5 to 8, 11	0
293	Acceleration/deceleration separate selection	0 to 2	0
294	UV avoidance voltage gain	0 to 200%	100%
299	Rotation direction detection selection at restarting	0, 1, 9999	0
331	RS-485 communication station number	0 to 31 (0 to 247)	0
332	RS-485 communication speed	3, 6, 12, 24, 48, 96, 192, 384	96

Parameter	Name	Setting Range	Initial Value
333	RS-485 communication stop bit length	0, 1, 10, 11	1
334	RS-485 communication parity check selection	0, 1, 2	2
335	RS-485 communication retry count	0 to 10, 9999	1
336	RS-485 communication check time interval	0 to 999.8s, 9999	0s
337	RS-485 communication waiting time setting	0 to 150ms, 9999	9999
338	Communication operation command source	0, 1	0
339	Communication speed command source	0, 1, 2	0
340	Communication startup mode selection	0, 1, 2, 10, 12	0
341	RS-485 communication CR/LF selection	0, 1, 2	1
342	Communication EEPROM write selection	0, 1	0
343	Communication error count	—	0
350 *5	Stop position command selection	0, 1, 9999	9999
351 *5	Orientation speed	0 to 30Hz	2Hz
352 *5	Creep speed	0 to 10Hz	0.5Hz
353 *5	Creep switchover position	0 to 16383	511
354 *5	Position loop switchover position	0 to 8191	96
355 *5	DC injection brake start position	0 to 255	5
356 *5	Internal stop position command	0 to 16383	0
357 *5	Orientation in-position zone	0 to 255	5
358 *5	Servo torque selection	0 to 13	1
359 *5	Encoder rotation direction	0, 1	1
360 *5	16 bit data selection	0 to 127	0
361 *5	Position shift	0 to 16383	0
362 *5	Orientation position loop gain	0.1 to 100	1
363 *5	Completion signal output delay time	0 to 5s	0.5s
364 *5	Encoder stop check time	0 to 5s	0.5s
365 *5	Orientation limit	0 to 60s, 9999	9999
366 *5	Recheck time	0 to 5s, 9999	9999
367 *5	Speed feedback range	0 to 400Hz, 9999	9999
368 *5	Feedback gain	0 to 100	1
369 *5	Number of encoder pulses	0 to 4096	1024
374	Overspeed detection level	0 to 400Hz	115Hz
376 *5	Encoder signal loss detection enable/disable selection	0, 1	0
380	Acceleration S-pattern 1	0 to 50%	0
381	Deceleration S-pattern 1	0 to 50%	0
382	Acceleration S-pattern 2	0 to 50%	0
383	Deceleration S-pattern 2	0 to 50%	0
384	Input pulse division scaling factor	0 to 250	0
385	Frequency for zero input pulse	0 to 400Hz	0
386	Frequency for maximum input pulse	0 to 400Hz	50Hz
393 *5	Orientation selection	0, 1, 2	0
396 *5	Orientation speed gain (P term)	0 to 1000	60
397 *5	Orientation speed integral time	0 to 20s	0.333s
398 *5	Orientation speed gain (D term)	0 to 100	1
399 *5	Orientation deceleration ratio	0 to 1000	20
414	PLC function operation selection	0, 1	0
415	Inverter operation lock mode setting	0, 1	0
416	Pre-scale function selection	0 to 5	0
417	Pre-scale setting value	0 to 32767	1
419 *5	Position command source selection	0, 2	0
420 *5	Command pulse scaling factor numerator	0 to 32767	1
421 *5	Command pulse scaling factor denominator	0 to 32767	1
422 *5	Position loop gain	0 to 150sec^{-1}	25sec^{-1}
423 *5	Position feed forward gain	0 to 100%	0
424 *5	Position command acceleration/deceleration time constant	0 to 50s	0s
425 *5	Position feed forward command filter	0 to 5s	0s
426 *5	In-position width	0 to 32767pulse	100
427 *5	Excessive level error	0 to 400K, 9999	40K
428 *5	Command pulse selection	0 to 5	0
429 *5	Clear signal selection	0, 1	1
430 *5	Pulse monitor selection	0 to 5, 9999	9999
450	Second applied motor	0 to 8, 13 to 18, 20, 23, 24, 30, 33, 34, 40, 43, 44, 50, 53, 54, 9999	9999
451	Second motor control method selection	10, 11, 12, 20, 9999	9999
453	Second motor capacity	0.4 to 55kW, 9999/ 0 to 3600kW, 9999 *2	9999
454	Number of second motor poles	2, 4, 6, 8, 10, 9999	9999
455	Second motor excitation current	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
456	Rated second motor voltage	0 to 1000V	400V
457	Rated second motor frequency	10 to 120Hz	50Hz
458	Second motor constant (R1)	0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2	9999
459	Second motor constant (R2)	0 to 50Ω, 9999/ 0 to 400mΩ, 9999 *2	9999
460	Second motor constant (L1)	0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2	9999
461	Second motor constant (L2)	0 to 50Ω (0 to 1000mH), 9999/ 0 to 3600mΩ (0 to 400mH), 9999 *2	9999

Parameter	Name	Setting Range	Initial Value
462	Second motor constant (X)	0 to 500Ω (0 to 100%), 9999/ 0 to 100Ω (0 to 100%), 9999 *2	9999
463	Second motor auto tuning setting/status	0, 1, 101	0
464 *5	Digital position control sudden stop deceleration time	0 to 360.0s	0
465 *5	First position feed amount lower 4 digits	0 to 9999	0
466 *5	First position feed amount upper 4 digits	0 to 9999	0
467 *5	Second position feed amount lower 4 digits	0 to 9999	0
468 *5	Second position feed amount upper 4 digits	0 to 9999	0
469 *5	Third position feed amount lower 4 digits	0 to 9999	0
470 *5	Third position feed amount upper 4 digits	0 to 9999	0
471 *5	Fourth position feed amount lower 4 digits	0 to 9999	0
472 *5	Fourth position feed amount upper 4 digits	0 to 9999	0
473 *5	Fifth position feed amount lower 4 digits	0 to 9999	0
474 *5	Fifth position feed amount upper 4 digits	0 to 9999	0
475 *5	Sixth position feed amount lower 4 digits	0 to 9999	0
476 *5	Sixth position feed amount upper 4 digits	0 to 9999	0
477 *5	Seventh position feed amount lower 4 digits	0 to 9999	0
478 *5	Seventh position feed amount upper 4 digits	0 to 9999	0
479 *5	Eighth position feed amount lower 4 digits	0 to 9999	0
480 *5	Eighth position feed amount upper 4 digits	0 to 9999	0
481 *5	Ninth position feed amount lower 4 digits	0 to 9999	0
482 *5	Ninth position feed amount upper 4 digits	0 to 9999	0
483 *5	Tenth position feed amount lower 4 digits	0 to 9999	0
484 *5	Tenth position feed amount upper 4 digits	0 to 9999	0
485 *5	Eleventh position feed amount lower 4 digits	0 to 9999	0
486 *5	Eleventh position feed amount upper 4 digits	0 to 9999	0
487 *5	Twelfth position feed amount lower 4 digits	0 to 9999	0
488 *5	Twelfth position feed amount upper 4 digits	0 to 9999	0
489 *5	Thirteenth position feed amount lower 4 digits	0 to 9999	0
490 *5	Thirteenth position feed amount upper 4 digits	0 to 9999	0
491 *5	Fourteenth position feed amount lower 4 digits	0 to 9999	0
492 *5	Fourteenth position feed amount upper 4 digits	0 to 9999	0
493 *5	Fifteenth position feed amount lower 4 digits	0 to 9999	0
494 *5	Fifteenth position feed amount upper 4 digits	0 to 9999	0

Parameter	Name	Setting Range	Initial Value
495	Remote output selection	0, 1, 10, 11	0
496	Remote output data 1	0 to 4095	0
497	Remote output data 2	0 to 4095	0
498	PLC function flash memory clear	0 to 9999	0
503	Maintenance timer	0 (1 to 9998)	0
504	Maintenance timer alarm output set time	0 to 9998, 9999	9999
505	Speed setting reference	1 to 120Hz	50Hz
506	Parameter 1 for user	0 to 65535	0
507	Parameter 2 for user	0 to 65535	0
508	Parameter 3 for user	0 to 65535	0
509	Parameter 4 for user	0 to 65535	0
510	Parameter 5 for user	0 to 65535	0
511	Parameter 6 for user	0 to 65535	0
512	Parameter 7 for user	0 to 65535	0
513	Parameter 8 for user	0 to 65535	0
514	Parameter 9 for user	0 to 65535	0
515	Parameter 10 for user	0 to 65535	0
516	S-pattern time at a start of acceleration	0.1 to 2.5s	0.1s
517	S-pattern time at a completion of acceleration	0.1 to 2.5s	0.1s
518	S-pattern time at a start of deceleraiton	0.1 to 2.5s	0.1s
519	S-pattern time at a completion of deceleraiton	0.1 to 2.5s	0.1s
539	Modbus-RTU communication check time interval	0 to 999.8s, 9999	9999
547	USB communication station number	0 to 31	0
548	USB communication check time interval	0 to 999.8s, 9999	9999
549	Protocol selection	0, 1	0
550	NET mode operation command source selection	0, 1, 9999	9999
551	PU mode operation command source selection	1, 2, 3	2
555	Current average time	0.1 to 1.0s	1s
556	Data output mask time	0.0 to 20.0s	0s
557	Current average value monitor signal output reference current	0 to 500/ 0 to 3600A *2	Rated inverter current
563	Energization time carrying-over times	(0 to 65535)	0
564	Operating time carrying-over times	(0 to 65535)	0
569	Second motor speed control gain	0 to 200%, 9999	9999
570	Multiple rating setting	0 to 3	2
571	Holding time at a start	0.0 to 10.0s, 9999	9999
573	4mA input check selection	1, 9999	9999
574	Second motor online auto tuning	0, 1	0
575	Output interruption detection time	0 to 3600s, 9999	1s

Parameter	Name	Setting Range	Initial Value
576	Output interruption detection level	0 to 400Hz	0Hz
577	Output interruption cancel level	900 to 1100%	1000%
592	Traverse function selection	0, 1, 2	0
593	Maximum amplitude amount	0 to 25%	10%
594	Amplitude compensation amount during deceleration	0 to 50%	10%
595	Amplitude compensation amount during deceleration	0 to 50%	10%
596	Amplitude acceleration time	0.1 to 3600s	5s
597	Amplitude deceleration time	0.1 to 3600s	5s
611	Acceleration time at a restart	0 to 3600s, 9999	5/15s *2
665	Regeneration avoidance frequency gain	0 to 200%	100
684	Tuning data unit switchover	0, 1	0
800	Control method selection	0 to 5, 9 to 12, 20	20
802 *5	Pre-excitation selection	0, 1	0
803	Constant power range torque characteristic selection	0, 1	0
804	Torque command source selection	0, 1, 3 to 6	0
805	Torque command value (RAM)	600 to 1400%	1000%
806	Torque command value (RAM,EEPROM)	600 to 1400%	1000%
807	Speed limit selection	0, 1, 2	0
808	Forward rotation speed limit	0 to 120Hz	50Hz
809	Reverse rotation speed limit	0 to 120Hz, 9999	9999
810	Torque limit input method selection	0, 1	0
811	Set resolution switchover	0, 1, 10, 11	0
812	Torque limit level (regeneration)	0 to 400%, 9999	9999
813	Torque limit level (3rd quadrant)	0 to 400%, 9999	9999
814	Torque limit level (4th quadrant)	0 to 400%, 9999	9999
815	Torque limit level 2	0 to 400%, 9999	9999
816	Torque limit level during acceleration	0 to 400%, 9999	9999
817	Torque limit level during deceleration	0 to 400%, 9999	9999
818	Easy gain tuning response level setting	1 to 15	2
819	Easy gain tuning selection	0 to 2	0
820	Speed control P gain 1	0 to 1000%	60%
821	Speed control integral time 1	0 to 20s	0.333s
822	Speed setting filter 1	0 to 5s, 9999	9999
823 *5	Speed detection filter 1	0 to 0.1s	0.001s
824	Torque control P gain 1	0 to 200%	100%
825	Torque control integral time 1	0 to 500ms	5ms
826	Torque setting filter 1	0 to 5s, 9999	9999
827	Torque detection filter 1	0 to 0.1s	0s
828	Model speed control gain	0 to 1000%	60%
830	Speed control P gain 2	0 to 1000%, 9999	9999

Parameter	Name	Setting Range	Initial Value
831	Speed control integral time 2	0 to 20s, 9999	9999
832	Speed setting filter 2	0 to 5s, 9999	9999
833 *5	Speed detection filter 2	0 to 0.1s, 9999	9999
834	Torque control P gain 2	0 to 200%, 9999	9999
835	Torque control integral time 2	0 to 500ms, 9999	9999
836	Torque setting filter 2	0 to 5s, 9999	9999
837	Torque detection filter 2	0 to 0.1s, 9999	9999
840 *5	Torque bias selection	0 to 3, 9999	9999
841 *5	Torque bias 1	600 to 1400%, 9999	9999
842 *5	Torque bias 2	600 to 1400%, 9999	9999
843 *5	Torque bias 3	600 to 1400%, 9999	9999
844 *5	Torque bias filter	0 to 5s, 9999	9999
845 *5	Torque bias operation time	0 to 5s, 9999	9999
846 *5	Torque bias balance compensation	0 to 10V, 9999	9999
847 *5	Fall-time torque bias terminal 1 bias	0 to 400%, 9999	9999
848 *5	Fall-time torque bias terminal 1 gain	0 to 400%, 9999	9999
849	Analog input offset adjustment	0 to 200%	100%
850	Brake operation selection	0, 1	0
853	Speed deviation time	0 to 100s	1s
854	Excitation ratio	0 to 100%	100%
858	Terminal 4 function assignment	0, 1, 4, 9999	0
859	Torque current	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
860	Second motor torque current	0 to 500A, 9999/ 0 to 3600A, 9999 *2	9999
862	Notch filter time constant	0 to 60	0
863	Notch filter depth	0, 1, 2, 3	0
864	Torque detection	0 to 400%	150%
865	Low speed detection	0 to 400Hz	1.5Hz
866	Torque monitoring reference	0 to 400%	150%
867	AM output filter	0 to 5s	0.01s
868	Terminal 1 function assignment	0 to 6, 9999	0
869	Current output filter	0 to 5s	0.02s
872	Input phase failure protection selection	0, 1	0
873	Speed limit	0 to 120Hz	20Hz
874	OLT level setting	0 to 200%	150%
875	Fault definition	0, 1	0
877	Speed feed forward control/ model adaptive speed control selection	0, 1, 2	0
878	Speed feed forward filter	0 to 1s	0s
879	Speed feed forward torque limit	0 to 400%	150%
880	Load inertia ratio	0 to 200 times	7

Parameter	Name	Setting Range	Initial Value
881	Speed feed forward gain	0 to 1000%	0%
882	Regeneration avoidance operation selection	0, 1, 2	0
883	Regeneration avoidance operation level	300 to 800V	760/ 785VDC *2
884	Regeneration avoidance at deceleration detection sensitivity	0 to 5	0
885	Regeneration avoidance compensation frequency limit value	0 to 10Hz, 9999	6Hz
886	Regeneration avoidance voltage gain	0 to 200%	100%
888	Free parameter 1	0 to 9999	9999
889	Free parameter 2	0 to 9999	9999
891	Cumulative power monitor digit shifted times	0 to 4, 9999	9999
892	Load factor	30 to 150%	100%
893	Energy saving monitor reference (motor capacity)	0.1 to 55/ 0 to 3600kW *2	Inverter rated capacity
894	Control selection during commercial power-supply operation	0, 1, 2, 3	0
895	Power saving rate reference value	0, 1, 9999	9999
896	Power unit cost	0 to 500, 9999	9999
897	Power saving monitor average time	0,1 to 1000h, 9999	9999
898	Power saving cumulative monitor clear	0, 1, 10, 9999	9999
899	Operation time rate (estimated value)	0 to 100%, 9999	9999
C0 (900)	FM terminal calibration	—	—
C1 (901)	AM terminal calibration	—	—
C2 (902)	Terminal 2 frequency setting bias frequency	0 to 400Hz	0Hz
C3 (902)	Terminal 2 frequency setting bias	0 to 300%	0%
125 (903)	Terminal 2 frequency setting gain frequency	0 to 400Hz	50Hz
C4 (903)	Terminal 2 frequency setting gain	0 to 300%	100%
C5 (904)	Terminal 4 frequency setting bias frequency	0 to 400Hz	0Hz
C6 (904)	Terminal 4 frequency setting bias	0 to 300%	20%
126 (905)	Terminal 4 frequency setting gain frequency	0 to 400Hz	50Hz
C7 (905)	Terminal 4 frequency setting gain	0 to 300%	100%
C8 (930)	Current output bias signal	0 to 100%	0%
C9 (930)	Current output bias current	0 to 100%	0%
C10 (931)	Current output gain signal	0 to 100%	100%
C11 (931)	Current output gain current	0 to 100%	100%
C12 (917)	Terminal 1 bias frequency (speed)	0 to 400Hz	0Hz
C13 (917)	Terminal 1 bias (speed)	0 to 300%	0%
C14 (918)	Terminal 1 gain frequency (speed)	0 to 400Hz	50Hz
C15 (918)	Terminal 1 gain (speed)	0 to 300%	100%
C16 (919)	Terminal 1 bias command (torque/magnetic flux)	0 to 400%	0%
C17 (919)	Terminal 1 bias (torque/ magnetic flux)	0 to 300%	0%
C18 (920)	Terminal 1 gain command (torque/magnetic flux)	0 to 400%	150%
C19 (920)	Terminal 1 gain (torque/ magnetic flux)	0 to 300%	100%
C38 (932)	Terminal 4 bias command (torque/magnetic flux)	0 to 400%	0%
C39 (932)	Terminal 4 bias (torque/ magnetic flux)	0 to 300%	20%
C40 (933)	Terminal 4 gain command (torque/magnetic flux)	0 to 400%	150%
C41 (933)	Terminal 4 gain (torque/ magnetic flux)	0 to 300%	100%
989	Parameter copy alarm release	10/100	10/100 *2
990	PU buzzer control	0, 1	1
991	PU contrast adjustment	0 to 63	58
Pr. CL	Parameter clear	0, 1	0
ALLC	All parameter clear	0, 1	0
Er.CL	Alarm history clear	0, 1	0
PCPY	Parameter copy	0, 1, 2, 3	0

*1 Differ according to capacities. (00023, 00038/00052 to 00126/00170, 00250/00310 to 01800/02160 or more)
*2 Differ according to capacities. (01800 or less/02160 or more)
*3 Differ according to capacities. (00250 or less/00310 or more)
*4 Differ according to capacities. (00250 or less/00310 to 01800/02160 or more)
*5 Setting can be made only when the FR-A7AP is mounted.

6 TROUBLESHOOTING

When an alarm (major failures) occurs in the inverter, the protective function is activated bringing the inverter to an alarm stop and the PU display automatically changes to any of the following error (alarm) indications.
If your fault does not correspond to any of the following errors or if you have any other problem, please contact your sales representative.

- Retention of alarm output signal ..... When the magnetic contactor (MC) provided on the input side of the inverter is opened at the activation of the protective function, the inverter's control power will be lost and the alarm output will not be held.
- Alarm display ..... When the protective function is activated, the operation panel display automatically switches to the above indication.
- Resetting method..... When the protective function is activated, the inverter output is kept stopped. Unless reset, therefore, the inverter cannot restart. *(Refer to page 18.)*
- When the protective function is activated, take the corresponding corrective action, then reset the inverter, and resume operation.
  Not doing so may lead to the inverter fault and damage.

Inverter alarm displays are roughly divided as below.

(1) Error Message
A message regarding operational fault and setting fault by the operation panel (FR-DU07) and parameter unit (FR-PU04 /FR-PU07) is displayed.
The inverter does not shut off output.

(2) Warnings
The inverter does not shut off output even when a warning is displayed. However, failure to take appropriate measures will lead to a major fault.

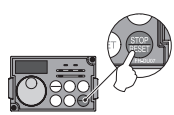
(3) Minor fault
The inverter does not shut off output. You can also output a minor fault signal by making parameter setting.

(4) Major fault
When the protective function is activated, the inverter output is shut off and an alarm is output.

6.1 Reset method of protective function

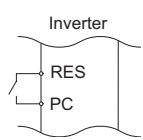
(1) Resetting the inverter
The inverter can be reset by performing any of the following operations. Note that the internal thermal integrated value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter.
Recover about 1s after reset is cancelled.

Operation 1: ..... Using the operation panel, press STOP RESET to reset the inverter.
(Enabled only when the inverter protective function is activated (major fault) (*(Refer to the Instruction Manual)* for major fault.))



Operation 2: ..... Switch power off once, then switch it on again.

Operation 3: ..... Turn on the reset signal (RES) for more than 0.1s. (If the RES signal is kept on, "Err." appears (flickers) to indicate that the inverter is in a reset status.)



6.2 List of alarm display

	Operation Panel Indication		Name
Error message	E - - -	E - - -	Alarm history
	HOLd	HOLD	Operation panel lock
	Er1 to Er4	Er1 to 4	Parameter write error
	rE1 to rE4	rE1 to 4	Copy operation error
	Err.	Err.	Error
Warnings	OL	OL	Stall prevention (overcurrent)
	oL	oL	Stall prevention (overvoltage)
	rb	RB	Regenerative brake prealarm
	rH	TH	Electronic thermal relay function prealarm
	PS	PS	PU stop
	MT	MT	Maintenance signal output
	CP	CP	Parameter copy
	SL	SL	Speed limit indication (Output during speed limit)
Minor fault	Fn	FN	Fan fault
Major fault	E.OC1	E.OC1	Overcurrent shut-off during acceleration
	E.OC2	E.OC2	Overcurrent shut-off during constant speed
	E.OC3	E.OC3	Overcurrent shut-off during deceleration or stop
	E.Ov1	E.OV1	Regenerative overvoltage shut-off during acceleration
	E.Ov2	E.OV2	Regenerative overvoltage shut-off during constant speed
	E.Ov3	E.OV3	Regenerative overvoltage shut-off during deceleration or stop
	E.THT	E.THT	Inverter overload shut-off (electronic thermal relay function)
	E.THM	E.THM	Motor overload shut-off (electronic thermal relay function)
	E.FIn	E.FIN	Fin overheat
	E.IPF	E.IPF	Instantaneous power failure
	E. bE	E.BE	Brake transistor alarm detection
	E.UVt	E.UVT	Undervoltage
	E.ILF	E.ILF*	Input phase failure
	E.OLT	E.OLT	Stall prevention

	Operation Panel Indication		Name
Major fault	E. GF	E.GF	Output side earth (ground) fault overcurrent
	E. LF	E.LF	Output phase failure
	E.OHT	E.OHT	External thermal relay operation
	E.PTC	E.PTC*	PTC thermistor operation
	E.OPT	E.OPT	Option alarm
	E.OP3	E.OP3	Communication option alarm
	E. 1 to E. 3	E. 1 to E. 3	Option alarm
	E. PE	E.PE	Parameter storage device alarm
	E.PUE	E.PUE	PU disconnection
	E.rET	E.RET	Retry count excess
	E.PE2	E.PE2*	Parameter storage device alarm
	E. 6 / E. 7 / E.CPU	E. 6 / E. 7 / E.CPU	CPU error
	E.CTE	E.CTE	Operation panel power supply short circuit, RS-485 terminal power supply short circuit
	E.P24	E.P24	24VDC power output short circuit
	E.CdO	E.CDO*	Output current detection value exceeded
	E.IOH	E.IOH*	Inrush current limit circuit alarm
	E.SER	E.SER*	Communication error (inverter)
	E.AIE	E.AIE*	Analog input error
	E. OS	E.OS	Overspeed occurence
	E.OSd	E.OSD	Speed deviation excess detection
	E.ECT	E.ECT	Signal loss detection
	E. Od	E.OD	Excessive position error
	E.MB1 to E.MB7	E.MB1 to E.MB7	Brake sequence error
	E.EP	E.EP	Encoder phase error
	E. bE	E.BE	Brake transistor alarm detection
	E.USb	E.USB*	USB communication error
	E. 11	E.11	Opposite rotation deceleration error
	E. 13	E.13	Internal circuit error

* If an error occurs when using the FR-PU04, "Fault 14" is displayed on the FR-PU04.

Appendix 1 Instructions for Compliance with the European Directives

(1) EMC Directive

We have self-confirmed our inverters as products compliant to the EMC Directive (second environment of conforming standard EN61800-3) and place the CE mark on the inverters.

Note: First environment
Environment including residential buildings. Includes buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.
Second environment
Environment including all buildings except buildings directly connected without a transformer to the low voltage power supply network which supplies power to residential buildings.

1) Notes

Install the inverter and perform wiring according to the following instructions.

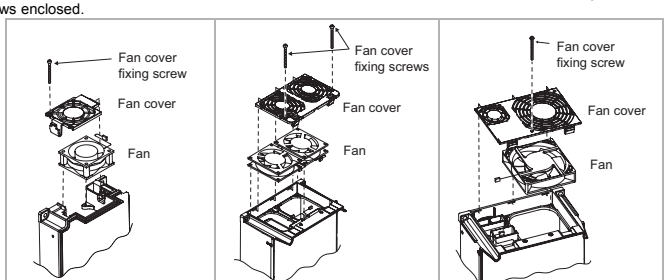
* The inverter is equipped with a built-in EMC filter. Set the EMC filter valid (initial setting).
* Connect the inverter to an earthed power supply.
* Install a motor and a control cable written in the EMC Installation Manual (BCN-A21041-204) according to the instruction.
* The cable length between the inverter and the motor is 5 m maximum.
* Confirm that the inverter complies with the EMC Directive as the industrial drives application for final installation.

(2) Low Voltage Directive

We have self-confirmed our inverters as products compliant to the Low Voltage Directive (Conforming standard EN 50178) and place the CE mark on the inverters.

1)Outline of instructions

* Do not use an earth leakage current breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth securely.
* Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)
* Use the cable sizes on *page 6* under the following conditions.
  · Ambient temperature: 40°C maximum
  If conditions are different from above, select appropriate wire according to EN60204 Appendix C TABLE 5.
* Use a tinned (plating should not include zinc) crimping terminal to connect the earth (ground) cable. When tightening the screw, be careful not to damage the threads.
  For use as a product compliant with the Low Voltage Directive, use PVC cable whose size is indicated on *page 6*.
* Use the moulded case circuit breaker and magnetic contactor which conform to the EN or IEC Standard.
* When using an earth leakage current breaker, use a residual current operated protective device (RCD) of type B (breaker which can detect both AC and DC). If not, provide double or reinforced insulation between the inverter and other equipment, or put a transformer between the main power supply and inverter.
* Use the inverter under the conditions of overvoltage category II (usable regardless of the earth (ground) condition of the power supply), overvoltage category III (usable with the earthed-neutral system power supply, 400V class only) and pollution degree 2 or lower specified in IEC664.
  · To use the inverter of 00770 or more (IP00) under the conditions of pollution degree 2, install it in the enclosure of IP 2X or higher.
  · To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.
  · To use the inverter of 00620 or less (IP20) outside of an enclosure in the environment of pollution degree 2, fix a fan cover with fan cover fixing screws enclosed.



FR-A740-00083, 00126	FR-A740-00170 to 00380	FR-A740-00470, 00620

* On the input and output of the inverter, use cables of the type and size set forth in EN60204 Appendix C.
* The operating capacity of the relay outputs (terminal symbols A1, B1, C1, A2, B2, C2) should be 30VDC, 0.3A. (Relay outputs are basically isolated from the inverter internal circuit.)
* Control circuit terminals on *page 3* are safely isolated from the main circuit.
* Environment

	During Operation	In Storage	During Transportation
Ambient temperature	LD, ND (initial setting), HD: -10°C to +50°C SLD: -10°C to +40°C	-20°C to +65°C	-20°C to +65°C
Ambient humidity	90% RH or less	90% RH or less	90% RH or less
Maximum altitude	1000m	1000m	10000m

Details are given in the technical information "Low Voltage Directive Conformance Guide" (BCN-A21041-203). Please contact your sales representative.

Appendix 2 Instructions for UL and cUL Compliance

(Conforming standard UL 508C, CSA C22.2 No.14)

(1) Installation

This inverter is a UL-listed as a product for use in an enclosure.
Design an enclosure so that the inverter ambient temperature, humidity and atmosphere satisfy the specifications. *(Refer to page 1.)*

Wiring protection

For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code and any applicable provincial codes.
For installation in Canada, branch circuit protection must be provided in accordance with the Canadian Electrical Code and any applicable provincial codes.
Provide the appropriate UL and cUL listed Class RK5, Class T or Class L type fuse or UL489 molded case circuit breaker (MCCB) that is suitable for branch circuit protection in accordance with the table below.

FR-A740-□□□□□-EC		00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800
Rated fuse voltage(V)		480V or more														
Fuse Maximum allowable rating (A)	Without power factor improving reactor	6	10	15	20	30	40	70	80	90	110	150	175	200	250	300
	With power factor improving reactor	6	10	10	15	25	35	60	70	90	100	125	150	175	200	250
Molded case circuit breaker (MCCB) Maximum allowable rating (A)*		15	15	15	20	30	40	60	70	90	100	150	175	225	250	450

FR-A740-□□□□□-EC		02160	02600	03250	03610	04320	04810	05470	06100	06830	07700	08660	09620	10940	12120
Rated fuse voltage(V)		500V or more													
Fuse Maximum allowable rating (A)	Without power factor improving reactor	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	With power factor improving reactor	300	350	400	500	600	700	800	900	1000	1100	1200	1350	1500	1800
Molded case circuit breaker (MCCB) Maximum allowable rating (A)*		500	600	800	900	1000	1200	1200	1200	1600	1600	2000	2000	2500	3000

* Maximum allowable rating by US National Electrical Code at SLD rating.
Exact size must be chosen for each installation.

(2) Wiring of the power supply and motor

For wiring the input (R/L1, S/L2, T/L3) and output (U, V, W) terminals of the inverter, use the UL Listed copper, stranded wires (rated at 75°C) and round ring crimping terminals. Crimp the crimping terminals with the crimping tool recommended by the terminal maker.

(3) Short circuit ratings

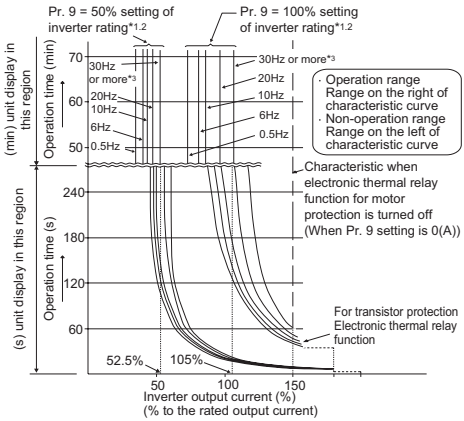
- Model 01800 or less
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 528V Maximum.
- Model 02160 or more
  Suitable For Use in A Circuit Capable Of Delivering Not More Than 100kA rms Symmetrical Amperes, 550V Maximum.

(4) Motor overload protection

This inverter is certified as a motor overload protection device by UL.

When using the electronic thermal relay function as motor overload protection, set the rated motor current to *Pr. 9 Electronic thermal O/L relay*.

Electronic thermal relay function operation characteristic



This function detects the overload (overheat) of the motor, stops the operation of the inverter's output transistor, and stops the output.

(The operation characteristic is shown on the left)

When using the Mitsubishi constant-torque motor

1) Set "1" or any of "13" to "18", "50", "53", "54" in *Pr. 71*. (This provides a 100% continuous torque characteristic in the low-speed range.)
2) Set the rated current of the motor in *Pr. 9*.

*1 When a value 50% of the inverter rated output current (current value) is set in *Pr. 9*

*2 The % value denotes the percentage to the inverter rated output current. It is not the percentage to the motor rated current.

*3 When you set the electronic thermal relay function dedicated to the Mitsubishi constant-torque motor, this characteristic curve applies to operation at 6Hz or higher.

CAUTION

- Protective function by electronic thermal relay function is reset by inverter power reset and reset signal input. Avoid unnecessary reset and power-off.
- When multiple motors are operated by a single inverter, protection cannot be provided by the electronic thermal relay function. Install an external thermal relay to each motor.
- When the difference between the inverter and motor capacities is large and the setting is small, the protective characteristics of the electronic thermal relay function will be deteriorated. In this case, use an external thermal relay.
- A special motor cannot be protected by the electronic thermal relay function. Use the external thermal relay.

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REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Mar., 2006	IB-0600256ENG-A	First edition
Feb., 2007	IB-0600256ENG-B	Additions • Setting value "74" of Pr.178 to Pr.189 • Breaker selection when using the inverter as UL or cUL listed product

⚠ For Maximum Safety

- Mitsubishi inverters are not designed or manufactured to be used in equipment or systems in situations that can affect or endanger human life.
- When considering this product for operation in special applications such as machinery or systems used in passenger transportation, medical, aerospace, atomic power, electric power, or submarine repeating applications, please contact your nearest Mitsubishi sales representative.
- Although this product was manufactured under conditions of strict quality control, you are strongly advised to install safety devices to prevent serious accidents when it is used in facilities where breakdowns of the product are likely to cause a serious accident.
- Please do not use this product for loads other than three-phase induction motors.